of November, the same species having long previously shed their leaves in Germany. In a similar manner, the fig-trees in Lower Egypt (31° N. lat.) were partially clothed with foliage at the beginning of December, and in Upper Egypt (27° N.) were still in full leaf, whilst already, on the 24th of November, they were quite bare in the Apulian plain (41° N.). On the 11th of December, the pomegranate trees in the gardens of Siout were in yellow leaf, and on New Year's Day, 1874, the apricot trees at Farafreh were still in their prime of green leaf. Hence, one might readily imagine that on approaching nearer the equator these same species would exhibit no interval between the fall and the renewal of the foliage, and thus, to all intents and purposes, become evergreen. But this phenomenon was only verified in the case of the little cultivated peach trees of the oases, in which it may not be constant. Moreover, the peach tree shows the same tendency in mild seasons with us. In the oases, at the beginning of March, when the trees began to blossom and make new growth, the old leaves were still fresh and capable of assimilation. All other deciduous trees and shrubs cultivated in the gardens of Kasr Dghakel (25° 45′ N. lat.), including the grape-vine, apricot, apple, pomegranate, plum, fig, mulberry, and willow (*Salix safsaf*), had lost their foliage on the arrival of Dr. Ascherson, or became leafless before the end of January. It should be mentioned that the fall of the leaf in this region does not proceed with the same regularity as at home, for it is not unusual to see quite naked and fully clothed trees of the same species standing side by side. Again, the presence of abundance of moisture has the effect of enabling the trees to carry their old foliage longer and put forth their new earlier than trees growing in drier situations. And some of the willows growing by water were quite evergreen; that is, after the manner of the peach trees mentioned above. But the apricot, one of the most abundant trees, rarely retained even a few scattered old leaves on the appearance of the flowers. The same was observed of the grape-vine, fig, and mulberry. By Feb. 20 the apricot trees were in full blossom, and by March 10 in full foliage, so that there was only an interval of four or five weeks between the fall of the old foliage and complete development of the new. The apple and plum behaved in a similar manner, the pomegranate was a little later, the fig next in order, and finally the mulberry; whilst these same things, in the reverse sense, lost their leaves first. From the preceding notes it seems that the fall and renewal of the leaf is an essential constitutional peculiarity, which is modified by climatal conditions, but not entirely subject to them. A more striking illustration of this fact may be found in exotic deciduous trees planted in Egypt. Dr. Ascherson noted more particularly the summer fall of the leaves of *Poinsettia pulcherrima*, a South American shrub, and *Albizzia lebbek*, a native of the East Indies. The former is in the full splendour of its inflorescence in December, and quite leafless in April, remaining so, it is said, until the autumn. The Albizzia is extensively planted as an avenue tree. It sheds its foliage in April, but soon renews it. Both of these plants lose their leaves in their native countries during the dry, and renew them with the opening of the rainy season.

SCIENTIFIC SERIALS

Journal de Physique, III., No. 34, Oct. 1874.—This number commences with the first portion of a paper by M. J. Bertrand, entitled "Demonstration of Theorems relating to Electrodynamic Actions." The object of this paper is to simplify Ampère's demonstrations of the theorems of electrodynamics.—Arrangement for obtaining projections of the metallic rays and their reversal, by M. Boudréaux. Instead of the electric light or oxyhydrogen flame, the author employs a mixture of the chlorate of the metal with one-sixth of its weight of powdered gum-lac. The mixture is inflamed in a carbon crucible placed in a lantern provided with a vertical slit. Reversals of the metallic lines are effected by allowing a beam of white light (Drummond or sun-light) to pass through the deflagrating mixture and analysing the resulting rays by prisms. By allowing the sun-light to fall only on one-half of the slit, the coincidence of bright with dark lines can be shown.—M. Mascart contributes a paper describing two pieces of apparatus for obtaining the phenomena of interference.—On the magnetisation of steel, by M. E. Bouty.—This number contains a translation of Lord Rayleigh's paper on the manufacture and theory of diffraction gratings from the *Philosophical Magazine* for February and March.—Sensibility of silver bromide to rays supposed to be chemically inactive, by H. Vogel, from *Poggendorff's Annalen*.—From the same journal there is a paper by H. Streintz, on changes in the length and elasticity of a wire under the influence of an electric current.—From the Proc. Roy. Soc. there are translations of Prof. Tyndall's paper on the transmission of sound, and Mr. Norman Lockyer's note on a new class of absorption phenomena.

Zeitschrift der Oesterreichischen Gesellschaft für Meteorologie. Nov. 15.—In this number Dr. Hann treats of some of the consequences of the laws of change of temperature in air undergoing change of volume. The following are some of the results of his argument, which is full of interest. The rate of cooling of ascending air varies so much with the conditions of time and place that it cannot be expressed by any general law. But both in Germany and in the tropics the mean rate lies between 0°·5 and 0°·6 C. for every 100 metres. Air warmed at the surface of the earth does not continue to rise until it reaches a level where the temperature corresponds with its own (reduced), but becomes thoroughly mixed with other strata before reaching that height. Temperature falls more rapidly with increase of height in bad than in fine weather. In a descending current there can be no condensation of moisture, and so in it the theoretical increment of 1° C. does take place. We would expect this current to clear the sky. But in fact we find that a descending current often brings rain as well as warmer weather. Our moist west winds do not bring their moisture from the tropics, but the Anti-trade, becoming warmer as it descends, collects a fresh quantity of vapour and precipitates it again when cooled by radiation or ascent of mountain slopes. The formation of hail and phenomena of hailstorms are best understood by supposing, with Reye, the lower hot moist strata to rise rapidly to a great height, not the upper air to descend, as it has been shown that this would become much warmer in descending. A cold wind blows first in the higher parts of the atmosphere, and the over-heated air below rushes upward with unusual energy to a height where precipitated moisture freezes as it falls. This ascending movement of warm air, and the further impulse given to it by liberation of the latent heat of vapour, appear to play a large part in the production and continuance of falls of rain. Dr. Hann holds the barometric minimum in the middle of a storm area to be a mechanical effect of the whirling movement of the air, and the moving force in cyclones to be the latent heat of vapour.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, Dec. 3.—"On the Coefficient of Expansion of a Paraffine of high boiling-point," by G. F. Rodwell, F.R.A.S., F.C.S., Science Master in Marlborough College. Communicated by Prof. Stokes, Sec. R. S.

The author, after giving an account of his researches, concludes that paraffine is a body which undergoes a most unusual expansion in passing from its ordinary solid condition to the high boiling-point which it possesses. He does not remember any other substance of a high boiling-point which occupies at the boiling-point a volume which is one-half as large again as the volume at the ordinary temperature. In an accompanying table he has introduced, side by side with the paraffine curve, the expansion curves of mercury, iodide of silver, and terbromide of phosphorus, one of the most expansible liquids known, if we except such bodies as ether, bromide of ethyl, acetate of methyl, &c., the boiling-point of which is below 100° C., and which, therefore, could not be easily introduced into the table for comparison with a body which boils at nearly 400° C.

Dec. 10.—"On the effect of Heat on the Iodide of Silver," by G. F. Rodwell, F.C.S. Communicated by Prof. F. Guthrie, F.R.S.

The author endeavours to prove the following main facts:—

1. That the iodide of silver exists in three allotropic forms, viz. (α) at temperatures between 116° C. and its fusing-point, as a plastic, tenacious, amorphous substance, possessing a reddish colour, and transparent to light; (β) at temperatures below 116° C. as a brittle, opaque, greenish-grey, crystalline mass; and (γ) if fused and poured into cold water, as an amorphous, very brittle, yellow, opaque substance.

2. That the iodide possesses a point of maximum density at or about 116° C. at the moment before passing from the amorphous into the crystalline condition.

3. That if we allow a mass of molten iodide to cool, the fol-

lowing effects may be observed :—(α) at the moment of solidification a very considerable contraction takes place ; (β) the solid, on further cooling, undergoes slight and regular contraction after the manner of solid bodies in general, until (γ) at or about 116° C. it undergoes sudden and violent expansion, passing from the amorphous into the crystalline condition ; (δ) after undergoing this expansion the mass on further cooling undergoes slight expansion, and (ϵ) the coefficient of contraction diminishes as the temperature decreases (or, otherwise expressed, the coefficient of contraction augments with the temperature).

"On the Multiplication of Definite Integrals," by W. H. L. Russell, F.R.S.

Geological Society, Dec. 2.—Mr. John Evans, F.R.S., president, in the chair.—The following communications were read :—On the femur of *Cryptosaurus cumerus*, Seeley, a Dinosaur from the Oxford clay of Great Gransden, by Mr. Harry Govier Seeley, F.L.S., Professor of Physical Geography in the Bedford College, London. The author described this femur as showing a slight forward bend in the lower third of the shaft, and as having the terminal portions wider in proportion to the length of the bone than in any described Dinosaurian genus. He pointed out its differences from the corresponding bone in Megalosaurus, Iguanodon, and other genera. The length of the femur was stated to be about one foot.—On the succession of the ancient rocks in the vicinity of St. David's, Pembrokeshire, with special reference to those of the Arenig and Llandeilo groups and their fossil contents, by Mr. Henry Hicks. In the first part of this paper the author described the general succession of the rocks in the neighbourhood of St. David's from the base of the Cambrian to the top of the Tremadoc group, and showed that they there form an unbroken series. The only break or unconformity recognised is at the base of the Cambrian series, where rocks of that age rest on the edges of beds belonging to a pre-Cambrian ridge. In the second part the author gave a minute description of the rocks, comparing the Arenig and Llandeilo groups, as seen in Pembrokeshire, with each other and also with those known in other Welsh areas. Each group he divided into three subgroups, chiefly by the fossil zones found in them. 1. The *Lower Arenig* was stated to consist of a series of black slates about 1,000 feet thick, and to be characterised chiefly by a great abundance of dendroid graptolites. 2. *Middle Arenig.*—A series of flags and slates, about 1,500 feet thick, and with the following fossils :—*Ogygia scutatrix*, *O. peltata*, *Ampyx Salteri*, &c. 3. *Upper Arenig.*—A series of slates, about 1,500 feet in thickness, only recently worked out, and found to contain a large number of new and very interesting fossils, belonging to the following genera, viz. : *Illænus*, *Illænopsis*, *Placoparia*, *Barrandia*, &c. 4. *Lower Llandeilo.*—A series of slates and interbedded ash, equivalent to the lowest beds in the Llandeilo and Builth districts, and containing species of Æglina, Ogygia, Trinucleus, and the well-known graptolites *Didymograptus Murchisoni* and *Diplograptus foliaceus*, &c. 5. *Middle Llandeilo.*—Calcareous slates and flags with the fossils *Asaphus tyrannus*, *Trinucleus Lloydii*, *Calymene cambrensis*, &c. 6. *Upper Llandeilo.*—Black slates and flags, with the fossils *Ogygia Buckii*, *Trinucleus fimbriatus*, &c. The Arenig series was first recognised in North Wales by Prof. Sedgwick about the year 1843, and was then discussed by him in papers presented to the Society. The Llandeilo series was discovered by Sir R. Murchison previously in the Llandeilo district, but its position in the succession was not made out until about 1844. The Geological Survey have invariably included the Arenig in the Llandeilo group ; but it was now shown that this occurred entirely from a mistaken idea as to the relative position of the two series, which were shown to be entirely distinct groups, the equivalents of both groups being present in Carnarvonshire, Shropshire, and Pembrokeshire, but the Llandeilo group only of the two being developed in Carmarthenshire. The lines of division in the series were said to be strongest at the top of the Menevian group and at the top of the Tremadoc group, these lines being palæontological breaks only, and not the result of unconformities in the strata.

Anthropological Institute, Dec. 8.—Mr. J. E. Price, F.S.A., in the chair.—Mr. M. J. Walhouse read a paper on the existence of a leaf-wearing tribe on the western coast of India. The author's residence at Mangalore for some years afforded him the opportunity of studying the habits of the native tribes of South Canara, and in the present communication he recorded a few facts concerning the Karagars, a remnant, now numbering only a few hundreds, of the aboriginal slave castes whose distinctive peculiarity was the habit of wearing aprons of woven twigs and green leaves over the usual garment. The custom at present is observed by the women only, who think that abandoning it will bring them ill luck. The author maintained that the leaf was a badge of degradation, and was a survival of a very ancient custom. The unswerving truthfulness of the Karagars is proverbial, and should be remarked as affording a complete refutation of Mr. Mill's assertion, that savages are invariably liars. The paper contained many interesting facts concerning the physical characteristics, traditions, religious rites, and habits of the tribe.—A paper by Mr. Rooke Pennington was read, on some tumuli and stone circles near Castleton, Derbyshire. It comprised a full account of the exploration of the barrow of Elden Hill, measuring 49 feet in diameter, which yielded bones of man, horse, and rat in great abundance, and a red deer's antler that had been worked. A few feet deeper was discovered a grave, containing the skeleton of a young person that had been buried in a contracted position ; no implements accompanied it, but it appeared to have been interred with much barbaric pomp. On the top of Siggett Hill was another barrow of somewhat less dimensions, in which was found a fine skeleton with an inverted urn, of the usual type, containing burnt bones. Evidence was adduced to prove that the corpse was not burnt until after the funeral feast was concluded, and the bones of the animals eaten were cast at the same time and into the same fire with the human body. This was one of those barrows which had led the author to conclude that in Derbyshire, at any rate, no connection can be established between the Neolithic age and contracted burial, and the bronze age and incremation.—Major Godwin-Austen contributed some further notes on the stone monuments of the Khasi Hills.

Mathematical Society, Dec. 10.—Prof. H. J. S. Smith, F.R.S., president, in the chair.—Prof. Cayley gave an account of his paper on the potentials of polygons and polyhedra.—Two notes from M. Mannheim to J. J. Sylvester, F.R.S., were, in the latter gentleman's absence, communicated by Mr. Tucker. The first note contained an elegant geometrical demonstration of the following propositions. $ABCD$ is a quadrilateral whose sides are of invariable magnitude, such that $ab = ad$ and $bc = cd$. The points a and b are fixed ; if m be a point rigidly connected with b, it will trace out, as the quadrilateral changes its form, the pedal of a conic. The problem has been treated in an analytical form by Prof. Cayley in a communication to the Society on the determination of the position of the node of a quartic curve, mentioned also in a paper read before the same Society by Mr. Samuel Roberts as a case of three-bar motion. This Mr. Cayley observed to be the inverse of a conic. Mr. Sylvester calls attention to M. Mannheim's proof as a very beautiful and purely geometrical one.—The second note is connected with a geometrical proof of a proposition thus stated by M. Mannheim :—"Lorsque le quadrilatère a, g, m, d, dont les cotés sont inégaux, mais dont les diagonales sont perpendiculaires entre elles, se déforment de façon que le sommet a décrive une circonférence (o) et les sommets g, d, des circonférences ayant même centre s sur la diagonale ma, le sommet libre m décrira une anallagmatique du 4^{e} ordre." This note relates to seven-bar motion, and is Peaucellier's motion, generalised by substituting for his rhomb any quadrilateral in which the two diagonals are at right angles, one case of which is the kite or spear-head form.

Royal Geographical Society, Dec. 14.—Major-General Sir H. Rawlinson, K.C.B., presided. The principal business was the reading of the report of the Livingstone Congo Expedition, by Lieut. W. T. Grandy, R.N. The President opened the proceedings by announcing the receipt of an interesting letter at the Foreign Office from Lieut. Cameron, the substance of which we have already given. Lieut. Cameron expressed his confident opinion, founded on Arab information, that the Lualaba river was in reality the Congo. Mr. Markham then read Lieut. Grandy's report, which was an itinerary of the writer's journey to the interior up to the date of his recall. Roads were being made by means of which the troops would be able to intercept the transit of slaves to the coast, and encouragement was being given to cultivate the india-rubber tree, of the value of which in Europe the natives had been hitherto ignorant. The chiefs had been exceedingly kind and hospitable to Lieut. Grandy and his party, and had promised facilities for future expeditions. He had found several traces of the Portuguese occupation of Congo, and he described the natives as being civilised, indolent, and exceedingly fond of snuff and tobacco. The palm-tree grew abundantly, but the principal use made of it by the natives was the distillation of the oil into a very intoxicating wine, in the use of which the king and chiefs indulged rather freely. Lieut. Grandy had shown his Majesty specimens of stearine, and he promised to commence its manufacture, instead of wine, from his palm oil. A terrible epidemic of small-pox was decimating Congo as Lieut. Grandy travelled through the country, and it almost entirely carried off his native porters and escort. In conclusion, the report described the Congo as being one of the grandest rivers in the world, and as being navigable for a distance of 110 miles from its mouth.

CAMBRIDGE

Philosophical Society, Nov. 30.—Prof. Humphry in the chair.—A paper on "Lopsided Generations," or "Right-handedness," by Dr. W. Ainslie Hollis, was read, which, judging from the abstract before us, contained little or no new matter. The author laid special stress on the statement that the left side of the brain in man is the larger, and that aphasia is connected with disease of that side; statements which, in the discussion which followed, Prof. Paget justly remarked were not yet in any way proved. The cases of Johnson and Swift were quoted as instances in which the left side of the brain had suffered, and paralysis of the right side had been induced, apparently as a consequence of overwork. Prof. Humphry and Mr. Carver both agreed that right-handedness was much a matter of education.—Dr. Wilson made a communication on the disposition of the peritoneum in man and other vertebrata, directing special attention to the peculiarities of the omental sac, which he showed to be frequently divided into two parts—a gastro-hepatic and a gastro-colic—by a constriction corresponding with the upper border of the stomach. One or more of the hepatic lobes usually project into the gastro-hepatic portion of the sac. In man, and we should therefore expect in others, it is the lobulus spigelii.

DUBLIN

Royal Irish Academy, Nov. 9.—William Stokes, F.R.S., president, in the chair.—Samuel Ferguson, V.P., read a paper on the Ogham-inscribed stone at Montaggart, Co. Cork. The author, in applying to this text, which had been considered undecipherable, the same method of translation adopted by the present Bishop of Limerick in the case of the Camp inscription, read it "Feqreq Moqoi Glunlegget," identifying Feqreq with the name Feàchra, as written by Adamnan, and assigning the meaning of "the Kneeler" to Glenlugget, which he took to be a name in religion; and expressed his belief that the monument is Christian.—A letter was read by the Secretary from Mr. R. R. Brash, commenting on Dr. Ferguson's paper.—Mr. H. W. Mackintosh read a paper on the muscular anatomy of *Cholœpus didactylus*.—Alexander Macalister, M.D., read a paper on two new species of Pentastoma. The first of these, *P. imperatoris*, was found in the lung and peritoneal cavity of *Boa imperator*, from South America; the second, *P. aonycis*, in the peritoneal cavity of *Aonyx leptonyx*, var. *B. major*, from the River Indus.—Alexander Macalister, M.D., also read a paper on the presence of a lachrymo-jugal suture in a human skull. Although the relation of the maxillary process of the jugal bone to the supra-orbital edge of the maxilla is subject to a considerable amount of variation, yet in the majority of cases this process ends at a point vertically over the infra-orbital foramen. But in one skull in the collection of Trinity College, Dublin, of which the history is unknown, the author found the maxillary process to stretch over the whole infra-orbital edge of the maxilla, in front of the large external hamulus of the lachrymal bone, with which it forms a suture of about a line and a half in length. The author further gives a sketch of the comparative anatomy of this suture.

PARIS

Geographical Society, Dec. 2.—President, M. Delesse.—Dr. Cosson declared himself decidedly against the scheme of forming a sea in the interior of Africa, on the site of the Tunisian "Chotts." He believes that not only would the climate of the Sahara be modified, but the great source of wealth of these regions—the culture of dates—would be completely destroyed. Moreover, the commercial results would never repay the enormous cost, estimated at about 12,000,000*l*. for Tunis, and a like sum for France. All the existing legitimate commerce is sufficiently carried on by means of caravans. It was, however, suggested that it would be wise to suspend judgment on the subject until the return of the French expedition, which is making preliminary investigations on the spot.—Dr. Hamy announced the discovery of new mines of gold in Australia, and of very ancient caverns which are expected to yield valuable results to geologists.—Dr. Harmand, one of the companions of the unfortunate Lt. Garnier, gave many interesting details concerning Tonquin.

Academy of Sciences, Dec. 7.—M. Frémy in the chair.—The following papers were read:—Memoir on the actions produced by the simultaneous concurrence of the currents from a battery and electro-capillary currents, by M. Becquerel.—Memoir on the intervention of physico-chemical forces in the phenomena of life, by M. Becquerel.—On the carpellary theory according to the Liliaceæ (*Yucca*), by M. A. Trécul.—On the swim-bladder from the point of view of station and locomotion, by M. A. Moreau.—Note on magnetism, by M. J. M. Gaugain.—On trials at acclimatising the "Jesuit's-bark" tree in the Isle of Réunion, by M. Vinson.—On the ureides of pyruvic acid; synthesis of a homologue of allantoïn, by M. Grimaux. In the present communication the author has examined the derivative obtained by the action of urea upon pyruvic acid. This body, named by its discoverer *pyvurile*, is a white crystalline substance of the formula $C_5H_8N_4O_3$. Treated with hydrochloric acid, it is converted into mono-pyruvic ureide, $CON_2H_2(C_3H_3O)$.—Application of illuminating gas to the pyrophone, by M. F. Kastner. The author's experiments show that if two or several isolated gas flames of convenient size are introduced into a tube of glass or other material at a distance of one-third of the length of the tube, reckoned from the lower extremity, these flames vibrate in unison, this phenomenon continuing as long as the flames remain separated, but ceasing immediately on their being brought into contact. The author likewise verifies the formation of ozone in the tubes.—Observations concerning species of the genus Phylloxera, by M. Signoret. The author publishes the following rectified synonymy:—*P. corticalis*, Kaltenb. = *Lichtensteinii*, Balbiani = *Rileyii*, Lich. MSS. Riley.—Method followed in searching for the most efficacious substance to oppose to Phylloxera at the viticultural station of Cognac, by M. Max Cornu.—Despatch from M. Stéphan, director of the Observatory of Marseilles. This refers to the discovery on the 6–7 December of a new comet by M. Borrelly.—Occultation of Venus, eclipse of the sun and of the moon, observed during the month of October at Paris, by M. C. Flammarion.—Solution of the equation of the third degree by means of a jointed system, by M. Saint-Loup.—On two simple laws of the active resistance of solids, by M. J. Boussinesq.—Determination of the analytical relations which exist between the elements of curvature of the two *nappes* of the evolute of a surface, by M. A. Mannheim.—On the solutions of chrome alum, by M. D. Gernez.—On the transformations of persulphocyanogen, by M. J. Ponomareff. Phosphoric chloride appears from the author's researches to have the following action:—

$$C_3N_3S_3H + 3PCl_5 = 2PCl_3 + S_2Cl_2 + PSCl_3 + HCl + C_3N_3Cl_3$$

The action of ammonia has also been studied.—On the transport and inoculation of virus, carbuncular and others, by flies, by M. J. P. Mégnin. The author considers it demonstrated that certain flies, such as Stomoxus, &c., can be agents of transmission of certain virulent maladies—amongst others carbuncle.—During the meeting the perpetual secretary announced to the Academy that they had sustained a heavy loss in the person of Count Jaubert.

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